Adding value to radiology with PACS Integrated Peer Review

Whether the underlying motivation is simply helping the patient, making intellectually satisfying and sophisticated reports, or just making money, a radiology report that adds value to the overall process is indispensable. Peer review is a tool that can significantly help to improve the quality of radiology reporting. This article describes the basic rationale behind peer review and discusses the development and implementation of a peer review function integrated in a PACS system.

Simply put, peer review is the assessment of a radiology report by a colleague, with the outcome of the process being either a discrepancy between the two opinions or not. One system that has been extensively advocated for peer review is the RadPeer system originally developed by the American College of Radiology (ACR). In RadPeer the level of discrepancy is indicated by a score. For example when there is no discrepancy the score is 1, and when there is a flagrant missed diagnosis that should clearly not have been overlooked by any radiologist, the score is 4. If the discrepancy has significant implications for the patient the attributed score can be further increased. Peer feedback is the communication of this review to or by our colleagues.

In practice, peer review requires technical IT solutions allowing easy integration with normal workflow and for optimal performance also requires good communication and professional skills on the part of the radiologist. Although peer review is being required more and more by external regulatory bodies, in many cases the decision to initiate implementation of a peer review system is based on intrinsic professional motivation on behalf of the radiologist.

IMPLEMENTATION OF PEER REVIEW

There are many ways to carry out peer review in practice. However, the use of simple, makeshift approaches such as separate paper notes, Excel lists or stand-alone additional software packages in practice lowers the chance that radiologists will regularly make use of the system in daily routine. Above all, the process of recording peer reviews should be easy and should not interrupt daily work-flow. Implementing peer review within a PACS integrated system can help to achieve these objectives.

PACS INTEGRATED PEER REVIEW

In a recent publication [1] we describe the development and implementation of PACS integrated peer review process. A key feature is the use of functions that are already available in the PACS, and so are familiar to the radiologists. In most PACS system examinations can be marked with a key-word or a teaching-file label. For every category in the RadPeer system we made a key-word that can be added to the report using a simple short-cut key. Every time a radiologist reviews an examination of a peer or colleague, he or she can add a key word to register this feedback. In our initial implementation we found that adding a small free text comment was somewhat cumbersome, but with our current PACS this is easy to do.

Our study indicates that the technical implementation and usage of the methodology was very easy. Thanks to the worklist functions available in a modern PACS, it is easy to retrieve the peer-review data. This can be done not only at a personal level, i.e. to enable the individual radiologist to check feedback from his/her direct colleagues, but also at a departmental level. Statistical analysis of the feedback data can also help to identify areas that need attention, and can provide a useful base and stimulus for a group discussion.

A satisfactory technical implementation of the peer-review process can help to significantly lower the threshold barrier which radiologists have to cross in order to participate. The absence of technical glitches or issues can facilitate increased participation of team members. However, apart from technical factors, the purely personal factors involved in peer review should not be neglected — peer feedback must be constructive. In our study [1] we underline...
the importance of establishing a broad-based agreement among all radiologists in the unit/department to ensure a seamless implementation.

**DISCUSSION**

A fundamental question arises as to whether it is reasonable to expect that effective peer review can be implemented simply as a result of regulatory requirements or external imposition. A recent evaluation study of such peer review reported that “58% of respondents agreed with the statement that peer review is merely done to meet hospital and regulatory requirements” while “44% agreed that peer review is a waste of time” [2]. In the light of this, it is important that peer review is not presented/degraded as just another administrative task. On the contrary, it should be seen as an opportunity for each radiologist to add value to his/her work. An established modern quality management concept is that people perform better and at higher quality in an environment that supports them; the systems they use should therefore be designed to minimize the possibility of mistakes [3].

In line with this, a smart PACS-integrated peer review implementation saves administrative time, and facilitates working on quality improvement by using registered peer review data. In our implementation the introduction of peer review into the system was accompanied with direct personal communication of any missed diagnoses. However this can also be structured.

Consensus-oriented group review (COGR) is a recent method that promotes discussion among peers [4], and leads to an overall enriched peer review process compared to the isolated recording of discrepant findings. COGR can also be effectively facilitated by functions in a standard PACS.

There are many parameters to be considered when setting up peer review/feedback processes, such as decisions as to which examinations should be subjected to peer review, when this should be done, by whom, and what action should be taken with the results. It is recommended that clear goals be established up front when initiating peer review in a department. A broad based agreement to use the system should also be established [5].

**FUTURE POSSIBILITIES**

After implementation of peer review and peer feedback among radiologists in a team, other types of feedback can also be considered. One example is feedback from referring physicians to the radiologist concerning the report. As “customers”of the radiology report and also as being responsible for patient management, referring physicians are excellent sources of feedback regarding the precise added value of the radiology report.

Just as feedback to radiologists can improve reporting, so can feedback from radiologists to technicians help in improving image quality. In cases of major quality issues, the radiologist should of course not hesitate to discuss a problem directly with the technician. However with less important issues, or in the case of a hospital with several physical locations and a single PACS, it is easy for the radiologist to decide to omit feedback.

Based as it is on key-words or teaching-file-labels the PACS integrated system described above can be easily used for such additional communication. Of course from time to time particular cases can also be discussed face-to-face, for example in a clinical educational meeting with technicians, their coach and a radiologist.

Back to peer review itself. Part of current peer review among radiologists identifies straightforward perception errors. A typical example of this could be a missed pulmonary lesion on a chest CT.

Another group of errors is related to incomplete reports. For example the relation with the vasculature may not be mentioned in a case of pancreatic cancer. In the future, issues in this second category of errors could be dealt with by personal peer review combined with automated methods. Artificial Intelligence (AI) methods could be developed to evaluate radiology reports on the basis of certain required criteria. This could be done afterwards as a monitoring service, but also in real time, where the radiologist is helped to avoid forgetting essential information in certain categories of reporting.

Decision support can also be combined with speech recognition, for example by adding a mini-template with the required characteristics to describe a tumor. This can be inserted in a report simply by giving a speech command. Such applications lie within the currently rapidly expanding field of deep learning and artificial intelligence, and could give rise to a question answering system capable of answering questions posed in natural language. Such developments could fundamentally change radiology.

We hypothesize that peer review will find more discrepancies in free text reports, as opposed to structured reports that are tailored to individual clinical scenarios. Peer review can identify areas in practices that need attention and subsequent quality improvement projects can help to make these changes. As an indication of the importance of the subject, the whole October 2015 issue of the journal Radiographics was dedicated to quality and safety issues, with many papers tailored to the needs of the radiologist in the effort to improve quality [6].

**CONCLUSION**

Peer review and peer feedback are important tools for added value in radiological patient care. Seamless implementation can be facilitated by use of functions already available in every PACS. Future developments such as extension of the system to other forms of feedback and to decision support have the potential for further quality improvements in radiology reporting.

**REFERENCES**